Preliminary Questions/Comments

Project: Cat Canyon Oil Field-Sisquoc and Monterey Formations

General Project and Aquifer Information

1. General Questions about the Application

    a. Section 8 of the application provides a response to the requirements at 40 CFR 146.4(b)(1)(2) and (3) and says that (b)(4) is "not applicable." The application also responds to 40 CFR 146.4(c) with a treatment feasibility study in Appendix 6-I. Please confirm that the aquifer exemption is requested pursuant to 40 CFR 146.4(a) and (b)(1).

    Although we provided responses to all the Safe Drinking Water Act requirements for exemption, this aquifer exemption is requested pursuant to 40 CFR 146.4(a) and (b)(1). The areas proposed for exemption are the hydrocarbon bearing areas in the Sisquoc and Monterey Formations as shown on Figures 1.2-1 and 1.2-2.

2. Areal Extent of the Aquifer Proposed for Exemption

    a. Are separate shape files available for each formation that show: the existing exempted area of the Sisquoc and Monterey Formations, and the area of the Sisquoc and Monterey Formations proposed to be exempted?

    These shape files are included in Appendix 7-I.

    b. Is information available to complete the following table for each formation (which EPA will need for the final decision document)?

AE Boundary Vertex Point Number	Township	Range	Section	Latitude	Longitude	Top Formation, Subsea Depth (feet)

This information is provided in the tables and maps located in the attachments at the end of this document.

3. General Project Information

   a. Do all eight operators identified on page 8 of the application have injection wells in the area proposed for exemption, or only the four that are listed on page 16?

      The following operators have injection wells in the area proposed for exemption: B.E. Conway Energy Inc., HVI Cat Canyon Inc., California Resources Production Corporation, ERG Operating Company LLC., and Vaquero Energy LLC. The four operators listed on page 16 actively participated in compiling the data and information for the current proposed aquifer exemption.

   b. How many Class II D and Class II R wells are in the area proposed for exemption?

      These numbers are subject to change as wells are abandoned and new wells are drilled. According to the Division's online map application, "Well Finder", there are 6 active Class II D wells and 113 active Class II R wells within the proposed exemption expansion area. In the existing exemption area, there are 18 active Class II D wells and 86 active Class II R wells.

4. Information about the Aquifer Proposed for Exemption

   a. The application states on page 120 that the sands of the Sisquoc Formation that comprise the producing intervals are named the S1b through S9 or S10, with the basal sands being locally named as the Brooks, the Thomas, and occasionally the Santa Margarita. Table 1.2-1 also mentions the Los Flores. Is this interval part of the previously exempted Sisquoc Formation?

      In 1954 the Los Flores Pool did include the basal Sisquoc sand (i.e., Brooks, Thomas and Santa Margarita sand equivalent) as well as the Monterey Formation. In 1973, the Los Flores only indicated the cherty zone in the Monterey Formation. To be consistent with the current exemption, Table 1.2-1 has been revised (attached) and correctly indicates that the Los Flores is part of the Monterey Formation.

   b. The application states on page 121 that in the West Area of the field, the Monterey Formation is sometimes named Los Flores. However, Table 1.2-1 indicates that Los Flores is part of the Sisquoc Formation. Please clarify.

      Table 1.2-1 has been revised (attached) and correctly indicates that the Los Flores is part of the Monterey Formation.

5. Depth and Thickness of the Aquifer Proposed for Exemption

    a. The application states on page 66 that the Sisquoc Formation ranges from 1,800 to 2,500 feet thick; however, on the north-south trending cross sections it appears to thin to about 800 feet to the north.

        i. Please clarify whether this depth range refers to the entire Sisquoc Formation, including the confining portion, or only the portion of the Sisquoc Formation that is proposed for exemption.

        This thickness range refers to the entire Sisquoc Formation. Page 66 has been revised to correctly reflect the thickness range. The revised page is attached to this document.

        ii. If it refers to the entire Sisquoc, what is the thickness of the portion of the Sisquoc Formation that is proposed for exemption?

        Please refer to the average thickness of the exemption interval described in Table 2 which is attached to this document.

    b. Why is the S1b interval not shown in cross sections D-D', E-E', or H-H'?

    The S1b interval is not shown on those cross sections because the focus of the aquifer exemption application is not on the individual sandstone members of the Sisquoc Formation. Instead, the application is focused on the entire Sisquoc and Monterey formations which are clearly specified on the cross sections.

    c. What is the average thickness of each formation that is proposed for exemption?

    Please refer to the average thickness of the exemption interval described in Table 2 which is attached to this document.

    d. Please provide the depth to the top of each formation proposed for exemption in depth below ground surface and relative to mean sea level (provide an average and a range, if possible).

    Please refer to Tables 2, 1a and 1b in the attachments.

6. Information on the TDS Content of the Aquifer

    a. Most of the TDS data are from the currently exempted areas. Are any additional TDS samples available from within the areas of the formations that are proposed for exemption?

All known TDS data are included in the aquifer exemption application in Appendix 5-IV Formation Water Analysis.

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7. Permeability and Porosity

   a. On page 120, the application states that the Sisquoc S1b-S10 sands have permeability as high as 3 Darcy. However, on the spreadsheet in Appendix 4-1, permeabilities based on conventional core data as high as 8 Darcy are shown. Please clarify.

      Page 120 was revised to show permeability as high as 8 Darcy. The revised page 120 is attached to this document.

      The application, on page 120, says that the Sisquoc S1b-S10 sands range in porosity from 25% to 63%; however, according to the spreadsheet provided in Appendix 4-1, porosity values based on conventional core data range from 2.3% to 48.8% in the Sisquoc Formation. Please clarify.

      The 25% to 63% porosity represents a combination of historical information from California Oil and Gas Fields, Volume II Publication No. TR12 and the core data found in the laboratory data sheets contained in Appendix 4-1. Well Tunnell S8 (API # 08322808) has porosity in the Sisquoc of 62.7%, which was rounded up to 63%. The lower porosity of 2.3% is not representative of a sand but of a portion of a calcified confining zone.

   b. Please clarify which sidewall core values in Appendix 4-1 are specific to the portion of the Sisquoc Formation that is proposed for exemption.

      In Appendix 4-I, there is a spreadsheet titled, "Summary of Core Data," which contains all known core data in the possession of the four operators who participated in the study. The data is labelled and separated by specific geologic interval.

   c. The application on page 66 states that core data in the Monterey Formation is not considered representative of the total formation properties due to localized natural fracturing. If this is the case, what is the basis of the porosity/permeability values for the Monterey Formation cited on pages 66 and 121 of the application?

      The porosity and permeability values of the producing Monterey Formation were estimated by Hubbert & Willis based on initial production values and volumetric studies of naturally fractured reservoirs published in 1955. The Monterey Formation in Cat Canyon was extensively studied as one of the significant

naturally fractured producing reservoirs in the United States (Hubbert, M. K., & Willis, D. (1955). Important Fractured Reservoirs in the United States. 4th World Petroleum Congress, 6-15 June, Rome, Italy).

8. Upper Confinement

   a. What data were used to create the isochore map in Figure 6.1-2 and cross sections J-J' and I-I' that show confinement in the northern area proposed for exemption, and are they from throughout the area mapped?

      The data used to create the isochore maps and cross sections were the depths and geophysical signatures on well logs from wells throughout the mapped area. These data were used to map the Upper Sisquoc Confining Layer which is continuous throughout the proposed aquifer exemption area except where it pinches out in the far northeast part of the field. In that area, the overlying Foxen Claystone confines injection into the Sisquoc Formation. Well log data is kept by the Division and is publicly available via the free web map, "Well Finder" (https://www.conservation.ca.gov/dog/Pages/WellFinder.aspx).

   b. Please provide thickness information for the sub-units of the Sisquoc Formation, particularly the Upper Sisquoc Confining Layer.

      We did not gather thickness information for each of the sub-units of the Sisquoc Formation because they are not independently proposed for exemption. This application proposes to exempt the entire Sisquoc Formation (except the upper confining layer) and not just the sub-units. The thickness of the Upper Sisquoc Confining Layer thickness is provided in Figure 6.1-2.

9. Lower Confinement

   a. What is the thickness of the Lower Sisquoc siltstones and claystones that provide lower confinement?

      While there are low permeable strata that underlay the injection intervals, lower confinement is ultimately provided by connate fluid incompressibility and the reservoir's pressure regime. Injected fluids are not expected to flow downwards because the pressures trend from high to low in an upward direction, and fluid incompressibility generally increases with depth. Pressure and confinement data are provided on Figure 5.1-19, Figure 5.1-20, in Appendix 5-V, and in Appendix 6-III. Thickness information is provided for the Upper Sisquoc Confining Layer on Figure 6.1-3.

   b. The application, on page 66 describes the basal sand contained within the Lower Sisquoc claystone.

i. Does this refer to the intermittent sands that DOGGR discussed with EPA in February 2018?

Yes.

ii. Do these sands contain water with a TDS content of less than 10,000 mg/L? If so, please describe the evidence for hydraulic isolation of these intermittent sands.

Within the standard deviation of the formation water data contained in Appendix 5-IV and analyzed in Appendix 6-I, the Sisquoc Formation in its present state contains waters bearing less than 10,000 mg/L TDS. Please refer to Table 1.1-1.

c. Figure 3.2-2 shows the Monterey Formation in contact with basement serpentinite in T8N R32W Sections 9 and 10. How does the serpentinite body affect lower confinement?

The lower confinement of the Monterey Formation is not affected by the serpentinite, and it is instead provided by an inward and upper pressure gradient toward the major producing areas. The serpentinite body is an ophiolite metamorphic sequence which existed prior to Monterey deposition. There is no active or historic fluid withdrawal from the serpentinite, so there is no accommodation space available for additional fluids. Therefore, the pressure regime does not facilitate the downward migration of fluids from the Monterey Formation into the serpentinite body.

10. Lateral Confinement

Is a map available that superimposes the sealing faults described throughout the application onto the area proposed for exemption? This would demonstrate how the faults provide confinement/relate to the AE boundaries.

The sealing faults described throughout the application are shown superimposed on the area proposed for exemption on Figure 1.2-1 and Figure 1.2-2. Figures 1-2-1b, 1-2-2b, and 4.2-2 to 4.2-4 show the sealing faults in relation to the current exempted areas.

11. Lateral Confinement to the East

a. The available pressure data across the normal fault in T8N R32W Sections 3 and 10 is from wells that are several miles from the southern portion of the eastern boundary of the area proposed for exemption. What evidence is there that the

fault's sealing properties are similar in the southern portion of the eastern boundary of the area proposed for exemption?

The sealing nature of the faults is documented on Figures 5.1-15 with differing groundwater gradients; 5.1-19 with different reservoir pressure data; and 5.1-20 with a variety of pressure data, tracer testing, and gas accumulations. In addition, published literature suggest the faults in this area are sealing (Sylvester, 1979) (DWR, 2004).

b. Please explain the mechanism for containment in the northeast corner of the area proposed for exemption (i.e., in the North Area Fault Block in T9N R32W Section 7, and T9N R33W Section 12).

The Sisquoc sands pinch out in the northeast portion of the area proposed for exemption in the North Area Fault Block (Figure 5.1-13, Cross section J-J'). The cross section demonstrates that the northern extent of the aquifer exemption boundary is defined by the last Sisquoc Sand to pinch out (S1b). The mechanism of containment is the lack of permeable reservoir in the area. Where the Sisquoc Sands are present, they are encapsulated by the Foxen Claystone, the Lower Sisquoc Confining layer, and the Upper Sisquoc Confining Layer where it exists. In addition, containment is provided by the inward pressure gradient caused by decades of fluid extraction from the producing formations in the field.

c. Please explain the mechanism of confinement along the southeastern boundary of the Monterey Formation AE in T9N R33W, Sections 20, 21, 28, 29, 33, and 34.

It appears the southeastern boundary of the Monterey Formation is in T9N R32W, Figure 5.1-20. The confinement is an unnamed sealing fault that is most clearly documented by Figure 5.1-15 Groundwater Gradient Map. In addition, published literature suggest the faults in this area are sealing (Sylvester, 1979) (DWR, 2004). Also, because the Monterey formation is primarily comprised of siliceous shale and cherts, it is only permeable where it is fractured (i.e. near some faults and along the crest of folds), so fluids are contained to the naturally fractured areas. In addition, containment is provided by the inward pressure gradient caused by decades of fluid extraction from the producing formations in the field.

d. For the Monterey Formation, the application states that the Garey Fault is sealing, but no supporting data are provided. Please provide evidence that this fault is sealing.

The confinement of the Garey Fault is most clearly documented by Figure 5.1-15, Groundwater Gradient Map. In addition, published literature suggest the faults in this area are sealing, including the Garey Fault (Sylvester, 1979) (DWR, 2004).

12. Lateral Confinement to the North
    a. Please describe where other productive sands of the Sisquoc Formation pinch out in the north relative to the S1b.
        i. Does the entire Upper Sisquoc pinch out?

The northern Sisquoc boundary was chosen where the Sisquoc S1b pinches out. South of the Sisquoc S1b pinch out, all of the lower Sisquoc sands are already thinned and are no longer present, Figure 3.2-11a and 3.2-11b Cross Section J-J'. The S1b is the last productive sand to pinch out. The lower confining layer pinches out further to the north as shown by Hall (Hall, 1978).

        ii. What productive units in the Monterey Formation extend to the north of the area proposed for exemption, and do they pinch out at or before the northern boundary as well? What data/evidence are available to support this information?

The Monterey Formation sub-crops north of the aquifer exemption boundary. The Monterey is the source rock as well as a producing zone in the Cat Canyon Oil Field. This means the Monterey Formation both generated the oil found in the Cat Canyon Oil Field and serves as a reservoir to store and produce oil. This is common for many of the oil fields found in the Santa Maria Basin. The proposed boundary in the northern area is based on northern most productive well in the Monterey(Figure 6.3-6).

13. Lateral Confinement to the West
    a. The application states that the Bradley Canyon Fault is sealing, but pressure data from only two wells on the eastern side of the Bradley Canyon Fault in the Monterey Formation are provided. Please provide additional evidence that the Bradley Canyon fault is sealing on the western boundary of the area proposed for exemption.

The sealing nature of the Bradley Canyon Fault is documented on Figures 5.1-15 with differing groundwater gradients, 5.1-19 with multiple points of different reservoir pressure data and 5.1-20 with a variety of pressure, gas accumulations and wells pressured above hydrostatic. In addition, published literature suggest the faults in this area are sealing (Sylvester, 1979) (DWR, 2004).

b. Please clarify which productive units are encompassed by the western boundary of the AE and whether they are all confined by the pinch-outs described in the application.
    i. If they do not all pinch out within the AE boundary, what is the means of confinement along the western boundary of the Sisquoc Formation that is proposed for exemption?

    On the western boundary there are producible Sisquoc sands below the S1b pinchout that require exemption for future production Figure 3.2 -7a and 3.2 -11b Cross Section F-F'. The Sisquoc Sands that do not pinch out are confined by an inward fluid gradient, Figure 5.1-19. The Monterey does not pinch out in a western direction. It is confined by an inward fluid gradient that directs fluids towards naturally fractured production areas proximal to faults and anticlines, Figure 5.1-20.

c. Please clarify the mechanism for confinement along the western boundary of the area proposed for exemption in the North Bradley Canyon Fault Block (T9N R33W Sections 15 and 16)

    The Sisquoc Sands and Monterey Formation are confined by an inward fluid pressure gradient in the North Bradley Canyon Fault Block (see Figures 5.1-19 and 5.1-20).

14. Lateral Confinement to the South

a. What is the mechanism of confinement for each formation in the extreme southern tip of the area proposed for exemption? What lower units are contained in this boundary?

    The mechanism of confinement is an inward fluid gradient present in the Monterey Formation and the Sisquoc sands (see Figures 5.1-19 and 5.1-20).

15. Ground Water Movement

a. In Table 5.1-7, the "cumulative to 1977" numbers do not appear to total to the "balance number" shown. That is, (228,852,985+898,501,621) – (176,028,000+33,360,333 + 63,722,653) equals 854,243,620 not -805,407,026 as shown on the table. Please clarify the discrepancy.

    Please see the updated table for 2017, the last full data year. The updated table is attached to this document.

b. Are the “cumulative to 2016” numbers on Table 5.1-7 inclusive of the “cumulative to 1977” numbers?

Yes, but the new table has been updated to show up to 2017. The updated table is attached to this document.

c. Are the cumulative data up to 1977 in Table 5.1-7 considered to be unreliable/poor quality (and therefore not be used to support the evaluation of ground water flow), or is it simply incomplete?

The cumulative data up to 1977 is derived from the California Conservation Committee reports and are less reliable than the 1977 to 2017 data but are reasonably representative of production and injection data. Production and injection data was collected by the Division prior to 1977 in an analog format and has not been fully digitized by the State. The California Conservation Committee reports are an accurate characterization of the pre-1977 data.

d. Table 6.2-1 shows that the volume injected exceeded the volumes withdrawn for several years (e.g., 1979-1982 and 1987). What information is available to support a determination that this scenario will not recur?

Historically, most produced water was not reinjected but rather was sent out of the Study Area to the Santa Maria River, Pacific Ocean, or piped to the Battles Gas Plant where it was treated and then put into the outfall. Appendix 5-V, Fluid Levels and Material Balance, contains a map showing the historic gathering system. The calculated voidage for the field as a function of the cumulative production (based on material balance) is plotted on Figure 6.2-2. Although in several years injection was greater than production, this is an unusual event and uncommon. Aquifer Exemptions contain no conditions, and it is the responsibility of the Division to ensure all injection occurs within and stay within the approved boundaries of the exemptions. All Under Ground Injection Control projects, current and future, will be evaluated and have conditions added to ensure that the exempted aquifers will not be pressured up to a point that would allow flow of injection water out of the exempt areas and into non-exempt aquifers. With sufficient dewatering of a zone, injection volumes can exceed concurrent production as long as the zone pressure is low enough to contain the injection fluids.

e. How do the mass balance values in Tables 5.1-7 and 6.2-1 compare? The sum of oil and water produced in Table 6.2-1 does not match the values in Table 5.1-7, or the difference between the cumulative to 2016 minus the cumulative through 1977 values in Tables 5.1-7. Please clarify.

The tables have been updated to include data up to 2017, and they both match. The updated tables are attached to this document.

f. The text of the application says that Table 5.1-7 shows cumulative production and injection data up to 2016; however, the mass balance data in Table 6.2-1 contains 2017 data. Please clarify the discrepancy.

The tables have been updated to include data up to 2017, and they both match. The updated tables are attached to this document.

g. In Appendix 5-V, the total amounts produced and injected on the tables "Production Assigned Zones" and "Injection Assigned Zones," respectively, do not match the information on Table 5.1-7. Please explain what those tables represent. Furthermore, the data presented as Table 6.2-2 in the file "DOGGR Injection & Production Data" in Appendix 5-V does not match Table 6.2-2 in the application. Please clarify the discrepancy.

"Production Assigned Zones" and "Injection Assigned Zones" show which wells produced or injected into which zones, not cumulative production or injection. Appendix 5-V does not match Table 6.2-2 because they were created by different people using different datasets. There's no telling which is incorrect since the discrepancies are slight. The volumes reported in Table 6.2-2 were calculated by WZI, Inc. who used DOGGR's online injection and production data (available at [HYPERLINK "ftp://ftp.consrv.ca.gov/pub/oil/online_data/production_injection_data/"]). DOGGR staff created the file, "DOGGR Injection & Production Data," in Appendix 5-V to check the various reported volumes and mass balance claims in the application, and they queried the data from DOGGR's internal database.

16. Information on Drinking Water Wells

a. Do the Alluvium and Paso Robles Formation of the San Antonio Basin serve as the water supply for all drinking water uses in the area of the Cat Canyon Oil Field?

The Alluvium, Paso Robles Formation, and the Careaga Formation provide drinking water for the area. The Paso Robles Formation is the main water bearing formation in the San Antonio Basin/ San Antonio Creek Valley (application page 121). For all water wells in and near the Cat Canyon Oil Field, Table 5.1-1 lists the designated use and the completed formation name. The intervals proposed for exemption are not a source of drinking water.

b. The application, on page 101, references a 2016 letter to B. Falkenhagen about the Los Alamos census designated place's (CDP's) well. Please provide a copy of this letter for inclusion in the record.

This letter is included in Appendix 6-1 Treatment Feasibility Study, Appendix III Water Purveyor Information, and the title of the Document is, "LACSD No Service Letter.pdf." This letter is the LACSD response to decline purchasing reverse osmosis water from the oilfields as part of the water treatment feasibility study. An email was provided by Kevin Barnard of the LACSD on April 20, 2017 with the wells used by LACSD for water production. That email is included in Appendix 6-1 Treatment Feasibility Study, Appendix III Water Purveyor information, and the title of the document is "LACSD Well Verification Contact Record.pdf."

c. What is the source of water for the community of Sisquoc if the Golden State Water Company's wells are currently inactive?

Golden State Water Company provides water to the community of Sisquoc through a variety of supplies, including the State Water Project, as stated in Appendix 6-I Treatment Feasibility Study Section 1.2.2.2.

i. Please include any active water supply wells for the Sisquoc Community on the inventory table.

There are no active water supply wells in the community of Sisquoc.

ii. Why are the Sisquoc Community CDP's two legacy wells (shown on Table 5.2-2) not included on Table 5.1-1? Please add them to the table for completeness and provide depth and screen/completion formation.

The two Sisquoc Community legacy wells are included on Table 5.1-1 as CC118 and CC119.

17. Water Well Table

a. Are the individual residential wells for the community of Garey on the inventory? If not, please add them to Table 5.1-1.

Yes, the individual residential wells for the community of Garey are included on Table 5.1-1 and Figure 5.1-3.

b. Do the wells identified as "domestic/irrigation" or "domestic/agricultural" on Table 5.1-1 have any potential use for human consumption? In particular, what

information is available about CC197, a domestic/irrigation well completed in the Careaga/Foxen/Sisquoc, to ensure that this well does not provide drinking water?

According to the USGS (https://water.usgs.gov/edu/wudo.html), domestic water use includes indoor and outdoor household purposes. Therefore, the wells identified as domestic/irrigation or domestic/agricultural could potentially be used to provide a house or farm with water including drinking water. Although CC197 is completed in the topmost portion of the Sisquoc Formation, it is not completed in the Sisquoc sands to be exempted. The well partially penetrates the Upper Sisquoc Confining Layer by approximately 40 feet. Approximately 500 vertical feet of fine-grained, low permeability siltstones and shales exists between the Sisquoc sands proposed for exemption and the base of the water well. This significant vertical separation, and the sealing properties of the Upper Sisquoc Confining Layer, will ensure that injected fluids are contained to the portion of Sisquoc sands to be exempted and will not affect the water well or any overlying aquifer.

c. Is depth/completion formation available for well CC066, a domestic well within the area proposed for exemption? If not, on what basis does DOGGR state that the well does not draw from the aquifers proposed for exemption?

Well CC066 has a completed depth of 225' in the Paso Robles Formation.

d. There are several typos/misspellings on Table 5.1-1 (e.g., in the purpose column). Please correct these so that EPA can include the table in the record of decision document.

Table 5.1-1 has been edited to fix these typos. The updated table is attached to this document.

e. Several wells on Table 5.1-1 are completed in the "Orcutt/Paso Robles/Careaga." Where is the Orcutt Formation relative to the formations that are proposed for exemption?

The Orcutt Formation is stratigraphically younger than the Paso Robles Formation, located above the upper confining layer.

f. The application says on page 9 that there are agricultural water wells completed in the Careaga Formation and the Foxen Formation located stratigraphically above the Sisquoc oil sands. However, according to Table 5.1-1, two irrigation wells (CC140 and CC141) are completed in the Alluvium/Paso Robles/Monterey.

Please clarify why the text does not mention that wells are completed in the Monterey Formation.

CC140 and CC141 are east of the Santa Maria River Fault which hydraulically isolates these wells from the proposed exemption area and the Cat Canyon Oil Field.

g. Well CC225 appears to be an irrigation well shown on Cross Section K-K' as completed in the Alluvium/Upper Sisquoc at 60 feet bgs. However, according to Table 5.1-1, this well is completed at 50 feet. Please clarify.

Table 5.1-1 shows a total depth of 60 feet bgs as does Cross Section K-K'. Although the well is screened to 50' for production purposes, the hydraulic continuity is based on 60' bgs.

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18. Logs and Core Data

a. According to the summary spreadsheet in Appendix 4-1, oil saturation values for the Monterey Formation range from 0 to 22.3%. On what basis is this formation considered to be oil productive; that is, what data indicate that the Monterey Formation is a producing zone, as the application notes on page 137?

The Monterey core data is included in Appendix 4-I (Core Data and Well Histories). Please note that the core data may not be representative of the total formation's properties due to natural fracturing (Nelson, 2001). The upper Miocene Monterey Formation of the Cat Canyon Oil Field was identified as one of the most important naturally fractured oil and gas producing reservoirs in the United States, (Hubbert & Willis, 1955). The large volumes of oil produced both historically and currently throughout the Cat Canyon Oil Field demonstrate that the Monterey Formation is a commercial source of hydrocarbons. It should be noted that the Monterey Formation is the petroleum source rock, not only for the entire Cat Canyon Oil Field, but all oil fields in the Santa Maria Basin. It contains hydrocarbons throughout its entirety, and where it is naturally fractured it is a commercially producible oil reservoir.

19. Production Data

a. What is the start date of the "cumulative to 1977" numbers on Table 5.1-7?

The Conservation Committee of California Oil and Gas Producers (CCCOGP) has historically collected production data from all oil and gas operators in the State of California since their inception in 1929, which is likely the start year for

Table 5.1-7. The cumulative data provided is the best available for the early years of the Cat Canyon Oil Field.

Attachments (16)

These attachments are revised components of the aquifer exemption application and may or may not be specifically referenced in the above correspondence. This list is hyperlinked for your convenience.

- Sisquoc Boundary Points
- Sisquoc Boundary Points Map
- Monterey Boundary Points
- Monterey Boundary Points Map
- Table 2 (Monterey and Sisquoc Formation Characteristics)
- Revised Table 1.2-1
- Revised Table 5.1-1 Water Well Inventory
- Revised Figure 5.1-3
- Revised Table 5.1-3
- Revised Table 5.1-7
- Revised Table 6.2-1
- Revised Page 69 (previously page 66)
- Revised Page 126 (previously page 120)
- Revised Page 83 (previously page 80)
- Revised Page 24 (previously page 22)
- Revised Page 137 (previously page 133)